

# 2000 Research Fellowships by Institution - contents

|  |    |
|--|----|
| • <a href="#">Australian Capital Territory</a> | 14 |
| • <a href="#">New South Wales</a>              | 38 |
| • <a href="#">Northern Territory</a>           | 0  |
| • <a href="#">Queensland</a>                   | 12 |
| • <a href="#">South Australia</a>              | 3  |
| • <a href="#">Tasmania</a>                     | 2  |
| • <a href="#">Victoria</a>                     | 18 |
| • <a href="#">Western Australia</a>            | 13 |

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|   |            |
|---|------------|
| <b>TOTAL NUMBER OF RESEARCH FELLOWSHIPS</b> | <b>100</b> |
|---|------------|

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## **Australian Capital Territory**

|  |           |
|--|-----------|
| Australian Geological Survey Organisation          | 0         |
| CAMBIA   | 0         |
| <a href="#">The Australian National University</a> | 14        |
| University of Canberra                             | 0         |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b>                 | <b>14</b> |

## **New South Wales**

|   |           |
|---|-----------|
| Australian Catholic University                          | 0         |
| Avondale College  | 0         |
| Centenary Institute of Cancer Medicine and Cell Biology | 0         |
| Centre for Advanced Studies in Physics                  | 0         |
| Charles Sturt University                                | 0         |
| <a href="#">Macquarie University</a>                    | 7         |
| Royal North Shore Hospital                              | 0         |
| Southern Cross University                               | 0         |
| The Australian Museum                                   | 0         |
| <a href="#">The Heart Research Institute</a>            | 1         |
| The University of New England                           | 0         |
| <a href="#">The University of New South Wales</a>       | 15        |
| <a href="#">The University of Newcastle</a>             | 1         |
| <a href="#">The University of Sydney</a>                | 13        |
| University of Technology, Sydney                        | 0         |
| <a href="#">University of Western Sydney</a>            | 1         |
| University of Wollongong                                | 0         |
| Victor Chang Cardiac Research Institute                 | 0         |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b>                      | <b>38</b> |

## **Northern Territory**

|                                    |          |
|------------------------------------|----------|
| Menzies School of Health Research  | 0        |
| Northern Territory University      | 0        |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b> | <b>0</b> |

## Queensland

|   |           |
|---|-----------|
| Bond University   | 0         |
| Central Queensland University                             | 0         |
| <a href="#">Griffith University</a>                       | 1         |
| <a href="#">James Cook University of North Queensland</a> | 5         |
| Queensland Institute of Medical Research                  | 0         |
| Queensland Museum   | 0         |
| Queensland University of Technology                       | 0         |
| <a href="#">The University of Queensland</a>              | 6         |
| University of Southern Queensland                         | 0         |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b>                        | <b>12</b> |

## South Australia

|  |          |
|--|----------|
| South Australian Museum                                    | 0        |
| <a href="#">The Flinders University of South Australia</a> | 1        |
| <a href="#">The University of Adelaide</a>                 | 2        |
| University of South Australia                              | 0        |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b>                         | <b>3</b> |

## Tasmania

|  |          |
|--|----------|
| Australian Maritime College            | 0        |
| <a href="#">University of Tasmania</a> | 2        |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b>     | <b>2</b> |

## Victoria

|   |           |
|---|-----------|
| <a href="#">Deakin University</a>                       | 1         |
| <a href="#">La Trobe University</a>                     | 2         |
| <a href="#">Ludwig Institute for Cancer Research</a>    | 1         |
| <a href="#">Monash University</a>                       | 5         |
| Murdoch Institute                                       | 0         |
| Museum of Victoria                                      | 0         |
| National Vision Research Institute                      | 0         |
| Peter MacCallum Cancer Institute                        | 0         |
| <a href="#">Royal Melbourne Institute of Technology</a> | 1         |
| St Vincent's Institute                                  | 0         |
| <a href="#">Swinburne University of Technology</a>      | 1         |
| <a href="#">The University of Melbourne</a>             | 7         |
| University of Ballarat                                  | 0         |
| Victoria University of Technology                       | 0         |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b>                      | <b>18</b> |

## Western Australia

|   |           |
|---|-----------|
| <a href="#">Curtin University of Technology</a>     | 1         |
| Edith Cowan University                              | 0         |
| King's Park and Botanic Garden                      | 0         |
| Murdoch University                                  | 0         |
| <a href="#">The University of Western Australia</a> | 12        |
| Western Australian Maritime Museum                  | 0         |
| <b>TOTAL NUMBER OF FELLOWSHIPS</b>                  | <b>13</b> |

# Macquarie University

F00001279

Dr P Cartigny

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2601 - GEOLOGY

**Title:** Characterisation of the diamond growth medium: a study of framesites (a polycrystalline aggregate of diamond)

**Summary:**

Studies of the carbon and nitrogen isotopic composition and the nature of mineral inclusions in diamonds have focussed mainly on gem-quality monocrystals. This study will undertake a detailed study of framesites (fine-grained polycrystalline diamond aggregates) that potentially contain much more information because of abundant mineral inclusions and higher carbon and nitrogen contents. State-of-the-art isotopic equipment will produce important new data to increase our knowledge of the growth environment and formation mechanism of diamonds, and the origin of volatiles responsible for their nucleation and growth. This new information will have larger applications to understanding Earth's volatile budget during its evolution.

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F00001353

Dr RD Gates

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2301 - MATHEMATICS

**Title:** Categorical models of software systems

**Summary:**

The project aims to contribute to the theory of extensive and distributive categories and apply this theory to modelling software systems. There is considerable current interest in the use of category theory in modelling computer systems, and the project is significant in its contribution to the development of this knowledge. A precise mathematical understanding of software systems is desirable to provide a foundation for next generation technologies in computer systems. The project expects to produce research papers in category theory, and clarify applications of this theory to modelling modern software engineering concepts.

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F00001289

Dr SV Konyagin

**Fellowship Type:** Senior Research Fellowship

**Category:** 2301 - MATHEMATICS

**Title:** Trigonometric series and exponential sums, and their application to the problems of analytic number theory

**Summary:**

A natural way to represent a function is as a trigonometric series. But whether that series represents the function adequately depends on its convergence, and divergence, properties. This project will settle deep questions on the adequacy of these representations. To study the distribution of prime numbers researchers have developed what might be called mathematical lenses to allow them to bring into focus certain aspects of prime numbers. This project will build such lenses. Bounds for exponential and character sums find application in coding theory, encryption, and construction of pseudo-random number generators. Improved estimates tailored to applications will be provided.

\*\*\*

F00001300

Ms RA Langdon

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 3801 - PSYCHOLOGY

**Title:** The cognitive neuropsychiatry of delusions: an investigation of the processes of normal and abnormal belief formation

**Summary:**

Current theories that explain delusions in terms of reasoning biases seem inadequate to account for bizarre delusions that persist despite overwhelming counter-evidence. This project will test whether delusions are better explained by a failure of normal belief rationalisation that occurs when an individual is unable to critically evaluate first-person experience (the evidence of our own senses) in light of general knowledge and the views of others. Reasoning and reflexive awareness will be examined in delusion-prone non-clinical individuals and deluded patients. Results from this project will advance our theoretical understanding of higher-order thought processes and may have implications for therapeutic practice.

\*\*\*

F00001294

Dr MR Leishman

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title: Understanding the processes of plant invasion into natural vegetation: comparative and experimental approaches**

**Summary:**

The invasion of introduced plants into natural vegetation communities poses a significant threat to biodiversity and ecosystem processes worldwide. The objective of this proposal is to develop a sound understanding of the processes of plant invasion in order to develop predictive theories, and hence better methods for prevention, control and ecological restoration. A combination of comparative and experimental approaches will be used to elucidate the strategies of plant invaders and the critical processes of invasion in relation to specific disturbance types.

\*\*\*

F00001314

Dr KG Rastle

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 3801 - PSYCHOLOGY

**Title: Speech production and reading aloud: towards a single model**

**Summary:**

The proposed research combines experimental psychology, computational modelling, and articulatory phonetics to elucidate the nature of speech production in reading aloud. Detailed computational models of reading aloud have not been subject to the important constraints imposed by research in speech production, leaving their language production components oversimplified. Experiments which investigate both the mental representation of phonology and the processes involved in articulation as applied to reading aloud will be conducted in pursuit of converging upon elaborated computational model consistent with the facts of speech production and reading aloud, thereby heightening our understanding of the whole human language processing system.

\*\*\*

F00001355

Dr SR Scalmer

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 3601 - POLITICAL SCIENCE

**Title:** The politics of spectacle: contemporary collective action and the public sphere

**Summary:**

This research project analyses changes in contemporary collective action. It is concerned with three interlinked processes: the rise of dramatic protest; the transmission of protest forms across national boundaries; the increasing emergence of collective action on the terrain of the media itself. These processes are examined within a novel framework that blends an analysis of collective action with a study of its reception within the public sphere. It aims to bring an historical perspective to the processes of contemporary change, to enrich our understanding of current politics, and to extend a number of overlapping theoretical literatures.

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# The University of New South Wales

F10007430

Mr ME Baird

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2604 - OCEANOGRAPHY

**Title:** Development of a mechanistic model of marine biological activity

**Summary:**

The development of predictive models of marine biological activity lags that in physical oceanography. While modellers of ocean circulation use primarily physical laws, biological processes have typically been modelled using empirical approximations. Many biological processes in the ocean, however, are constrained by quantifiable physical limits. This study aims to improve our ability to predict the dynamics of biological populations in the marine environment by the development of a model based on mechanistic descriptions of organisms interacting with their environment. The model's performance will be assessed by its ability to predict in situ and remotely sensed data from Australian waters.

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F10007445

Dr RJ Bursill

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Title:** Supercomputer Calculations for Correlated Electron Systems in Condensed Matter Physics and computational Chemistry

**Summary:**

Materials such as conjugated polymers have remarkable and commercially important electronic and optical properties that arise from their low dimensionality. Sophisticated and powerful new numerical techniques developed by the applicant will be implemented on some of Australia's fastest supercomputers to model a number of important low dimensional materials. Fascinating recent experimental results will be described and interpreted and insight will be gained into their unique physical properties.

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F10007418

Dr Y Dong

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2910 - GEOMATIC ENGINEERING

**Title:** Studies of decomposition of Pol-SAR, In-SAR and Pol-InSAR image data

**Summary:**

Recent advances in synthetic aperture radar (SAR) technologies have facilitated the acquisition of multi-frequency, polarimetric, and interferometric SAR data. This project aims to decompose these multiple measures to extract physical characteristics of terrain and vegetated surfaces. The significance of this project is to reveal the dependence of the measures on the terrain parameters, leading to optimal and robust algorithms for the retrieval of terrain parameters from these new radar data. The expected outcomes are 1) accurate estimation of forest and woodland biomass in Australia; 2) better digital elevation model generation by diminishing canopy effects; and 3) tree height retrieval.

\*\*\*

F10007439

Prof MA Green

**Fellowship Type:** Senior Research Fellowship

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Title:** Third generation thin-film solar cells

**Summary:**

Photovoltaics (the pollution-free, direct sunlight-to-electricity conversion using solar cells) is the most rapidly growing sector of the electricity generation industry, poised to become a multi-billion dollar industry over the coming decade. Australia has figured prominently in first-generation photovoltaic technology, based on silicon wafers, and is well positioned with second-generation technology involving photoactive thin-films deposited onto glass. Present and anticipated commercial energy-conversion efficiencies of 6-15% fall well below thermodynamic limits of 93%. The Fellowship targets work leading to a quantum leap to a higher energy conversion efficiency third and possibly ultimate generation technology, combining thin-films with advanced conversion concepts.

\*\*\*

F10007415

Ms DM King

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2301 - MATHEMATICS

**Title: Topological Entropy and Dynamical Systems**

**Summary:**

In the 1960s the rich structure in one-dimensional dynamics was exposed by Sharkovsky. A question arising from this work is that of characterising entropy-maximal permutations and cycles. It is a significant problem since the topological entropy of a permutation gives a sharp lower bound on the entropy of a map exhibiting this permutation type. This is a key to understanding the complexity of the map. This proposal aims and expects to complete this classification of entropy-maximal permutations and cycles. In addition the results obtained will be used to develop a definition of non-singular entropy.

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F10007424

Dr CH Lineweaver

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Title: Using the cosmic microwave background to measure the age, size and composition of the universe**

**Summary:**

My research program involves the combination, analysis and interpretation of the most recent measurements of the cosmic microwave background. The goal of this research project is to measure with unprecedented accuracy the most important ingredients of the big bang models of our universe. These include Hubble's constant, the density of the universe and the cosmological constant. Measurement of these parameters will tell us how old the universe is, how big it is and what the universe is made of.

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F10007438

Dr BE Medlyn

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2799 - OTHER BIOLOGICAL SCIENCES

**Title:** Forests as sinks or sources of carbon: Use of new data sets to improve model estimates.

**Summary:**

This project addresses one of the most important current environmental issues: will carbon sequestration by terrestrial ecosystems act as a positive or negative feedback to global climate change? The overall aim is to reduce key uncertainties in current predictions of the feedback due to carbon sequestration by forests: in particular, uncertainties regarding the processes of acclimation to temperature, carbon allocation, and plant-soil feedbacks. I aim to critically improve our ability to model these processes by testing state-of-the-art models against extensive new data sets, including high quality CO<sub>2</sub> flux data from 9 boreal, temperate and tropical forest site in 4 continents.

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F10007420

Dr BA Neilan

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title:** Non-ribosomal biosynthesis of cyanobacterial peptide toxins: A functional characterisation of microcystin synthetase

**Summary:**

Microcystin synthetase is a large multi-functional enzyme complex found in cyanobacteria (blue-green algae) and is responsible for the synthesis of microcystin. Microcystin is a small cyclic peptide which is a potent hepatotoxin and liver tumour promoter. We have recently cloned the genes for microcystin synthetase and now plan to investigate the specific enzymatic processes which result in the production of this toxin. This unique non-ribosomal peptide possesses specific characteristics, including protein phosphatase inhibition and bile acid transport, which are microcystin synthetase-directed. We plan to characterise these specific enzymatic modifications within defined regions of the microcystin synthetase complex as a basis for rational design of novel bioactive non-ribosomal peptides.

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F10007417

Dr J Nowotny

**Fellowship Type:** Senior Research Fellowship

**Category:** 2914 - MATERIALS ENGINEERING

**Title:** Interface processing of zirconia for environmental gas sensors and high performance solid oxide fuel cells

**Summary:**

This project aims at increasing the present state of understanding on interfaces, such as surfaces and grain boundaries, of oxide ceramic materials and their impact on properties. This understanding will provide the key to tailoring the properties of importance for applications. This project is focussed on zirconia, a key material for energy conversion. The specific aim is to develop zirconia with enhanced properties for construction environmental gas sensors and high-performance solid oxide fuel cells. The project will (1) make progress in the science and engineering of materials interfaces, (2) develop zirconia with enhanced properties for production of environmentally friendly energy and (3) develop gas sensors for environmental monitoring.

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F10007441

Dr AP Palazzo

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 4301 - HISTORICAL STUDIES

**Title:** Military learning and the two world wars in the Commonwealth armies

**Summary:**

The purpose of this study is to develop a general explanation for how military institutions interpret the lessons of past conflicts and incorporate them into their training, preparation and methodology of war. The project will achieve this objective through a comparative study of how the British, Canadian and Australian armies learned, or failed to learn, the lessons of the First World War. This mechanism will also provide a new interpretation to an important historical issue - the decline in the relative performance of the Commonwealth armies between the two world wars.

\*\*\*

F10007416

Dr HD Qi

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2301 - MATHEMATICS

**Title:** Stabilized quadratic programming based methods for variational inequality problems

**Summary:**

The quadratic programming based method is one of the main numerical methods for variational inequality problems., but its convergence is only established under strong assumptions as Robinson's strong regularity conditions. The aim of this proposal is to construct stabilized quadratic programming based methods which are globally and superlinearly/quadratically convergent under weak conditions and hence are applicable to a large variety of problems arising from economy and engineering. Some promising techniques will be introduced for the completion of the task. Extensive numerical experiments will lead to a highly reliable computer code which will be released to the mathematical programming community.

\*\*\*

F10007412

Dr XS Shang

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 3702 - SOCIAL WORK

**Title:** Moving towards an East Asian welfare model? China's social security system reforms

**Summary:**

The research will use a broad political economy approach to analyze the difficult process of reforming China's social security system. It will situate the case of China in its regional context and explore if there are any important elements of similarity and convergence between the welfare systems in East Asian societies and the new welfare system emerging in China. The research is very important in enriching the knowledge of China to Australia and other countries and of social policies to policy makers everywhere. The applicant expects to produce publishable manuscripts in Chinese and English as outcomes and to ensure that the findings are made available to relevant policy makers.

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F10007419

Dr K Suzuki

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2913 - METALLURGY

**Title:** Intergranular magnetic coupling in multiphase nanocrystalline magnetic materials and its role in improving their soft and hard magnetic properties

**Summary:**

There is considerable scope for research in the preparation of nanocrystalline magnetic materials that may exhibit improved soft or hard magnetic characteristics by means of appropriate modifications of structural and chemical properties in the intergranular region. The primary aim of this project is to establish experimentally the relationship between the intergranular magnetic coupling and the novel soft and hard magnetic behaviours in multiphase nanocrystalline systems. The secondary aim is to optimize the intergranular magnetic coupling by alloying. The significance of this work is that new nanocrystalline materials with improved magnetic properties may be achieved.

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F10007455

Dr RB Taylor

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title:** Chemically mediated seaweed-herbivore interactions in temperate Australasia

**Summary:**

Many seaweeds manufacture chemicals that deter grazers. The objective of the proposed research is better understand the role of chemical defenses in mediation seaweed-herbivore interactions on Australasian rocky reefs. The results will be used to evaluate the generality of North American based theories regarding the effects of geography and herbivore size on the interaction between seaweed chemical defenses and herbivores.

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F10007407

Mr J Wang

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2910 - GEOMATIC ENGINEERING

**Title:** The integrated analysis of GPS and GLONASS measurements for precise real-time positioning

**Summary:**

Satellite positioning technologies are increasingly becoming an important part of the worldwide geo-spatial information infrastructure. The integrated analysis of GPS and GLONASS measurements is a major milestone in satellite positioning, because it can dramatically improve the reliability and productivity of positioning. An integrated GPS-GLONASS positioning system, however, requires advanced data modeling and quality control techniques. This project aims to investigate the most challenging modeling and quality control issues. The outcomes of this research will be an optimal mathematical model, a realistic stochastic modeling method and robust quality control procedures that optimise the performance of integrated GPS-GLONASS positioning systems.

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# The University of Newcastle

F00001326

Dr AV Nguyen

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2907 - RESOURCES ENGINEERING

**Title:** Bubble-Particle Attachment in the Froth Flotation of Minerals

**Summary:**

The mineral processing industry relies heavily on flotation for the recovery of fine particles worth hundreds of millions of dollars annually to Australia. At the heart of the flotation process is the bubble-particle attachment mechanism which determines both selectivity and recovery rates for the overall operation. The proposal is to use state-of-the-art laser diagnostic equipment to quantify the attachment process which will provide experimental verification for a computational model. The study will increase our understanding of bubble-particle interactions to allow us to have greater control over actual flotation process and improve recovery and product quality.

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# University of Western Sydney

F00001252

Dr M Thomas

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 4203 - CULTURAL STUDIES

**Title:** Asian youth, identity and cultural consumption in Australia

**Summary:**

This project will examine the contested meanings of being 'Asian' in Australia for young people through an analysis of the role of cultural consumption in articulating their experiences. Detailed ethnographic fieldwork will study the salience of the category 'Asian' within their everyday social interactions as well as exploring the processes through which these youth construct their tastes in food, music, audiovisual media, styles of dress and leisure activities. The project has important practical and theoretical implications through its elaboration of recent advances in notions of youth, ethnicity and identity.

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# The University of Sydney

F10009060

Dr GP Brown

**Fellowship Type:** APD

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title: When to Breed?: The costs and benefits of alternative reproductive timing in tropical snakes.**

**Summary:**

Organisms display immense interspecific and intraspecific diversity in the time of year at which they reproduce. The underlying costs and benefits of breeding at different times of year are presumably the factors responsible for the evolution of that variation, but these costs and benefits are poorly understood. I propose an integrated series of descriptive and experimental studies on tropical snakes, designed to clarify the ecological consequences of alternative breeding schedules. The study will also be of direct use in terms of conservation biology.

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F10009045

Dr A Dutkiewicz

**Fellowship Type:** APD

**Category:** 2601 - GEOLOGY

**Title: Precambrian oil in fluid inclusions: new constraints on the generation and preservation of petroleum hydrocarbons.**

**Summary:**

Oil is believed to be restricted to rocks younger than 1600 million years old, decomposing over longer periods of time or when heated above 160 degrees C. Preliminary studies of oil inclusions trapped during early Precambrian time (3.8 to 1.6 billion years) in sandstones heated above 250 degrees C indicate that these views are incorrect. The aim of this project is to provide new constraints on the time-temperature limits for petroleum generation and preservation by analysing petroliferous fluid inclusions in unconventional reservoirs. The project will advance our understanding of petroleum distribution and geochemistry and may result in the discovery of more ancient oilfields.

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F10009018

Dr MG Gardiner

**Fellowship Type:** ARF

**Category:** 2502 - INORGANIC CHEMISTRY

**Title:** Advanced organo-lanthanide chemistry: studies of pyrrolide based metallocene and macrocyclic complexes

**Summary:**

There are abundant reserves of lanthanide minerals in Australia; however, their chemistry, particularly with regard to the development of commercial applications in industrial catalysis is underdeveloped. The aim of this project is to address part of this problem through the detailed study of carefully chosen organolanthanide compounds (specifically, featuring 4-azapentalenyl anions and modified calixpyrrole macrocycles). The research strategy will be directed towards improving our understanding of fundamental chemical processes that are directly relevant to the industrial production of important commodity chemicals and polymers from often under utilised petroleum industry waste stocks.

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F10009006

Dr BL Griffen-Foley

**Fellowship Type:** APD

**Category:** 4301 - HISTORICAL STUDIES

**Title:** A study of the intersections between Australian media companies, their proprietors, and politicians and political parties between 1945 and 1975.

**Summary:**

This project will explore the nature of the relationship between Australia's four major media companies and parliamentarians and party officials between 1945 and 1975. Although there has been much speculation about this relationship, particularly the role of the Murdoch and Packer families influencing media policy in return for party political support, there have been no systematic and detailed studies of this relationship. This project will be the first major consideration of the evolution of the relationship between the media and the political arena in Australia. The project will take the form of a book and a series of scholarly articles.

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F10009063

Dr SJ Hardy

**Fellowship Type:** APD

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Title:** Wave dispersion in a pulsar magnetosphere

**Summary:**

Pulsars are an important class of astronomical object which pulse at radio frequencies. In the thirty years since their discovery, an explanation of the way that these radio waves are produced has remained elusive. Recent Australian research in theoretical astrophysics has extended our understanding of how radio waves propagate through the plasma above the pulsar surface. Detailed modeling of the production and propagation of these radio waves, based on these new results, is now proposed. Comparison between the results of this model and Earth based observations will lead to significant advances in our understanding of the radio wave emission mechanism.

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F10009101

Dr EJ Harry

**Fellowship Type:** ARF

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title:** Bacterial cell division: the molecular mechanism and its precision.

**Summary:**

Cell division is a central theme in biology. Cells have a limited life span: to survive they must divide. In bacteria, we know where and when division occurs in the cell, but we don't know how it occurs or how it is regulated in time and space. This fundamental research addresses both questions and will enhance our understanding of uncontrolled cell division characteristic of cancer and facilitate design of new antibiotics that target the bacterial division machinery.

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F10009015

Dr MJ Maher

**Fellowship Type:** APD

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title:** Structural and Functional Studies of Metalloproteins.

**Summary:**

Metalloproteins containing g metals such as calcium, copper, iron or zinc play widely varying roles in Nature and support many of the essential processes of life. This project aims to examine three metalloproteins to look at the importance the metals play in their structure and function. These proteins are: dihydroorotase, a zinc-containing protein important for DNA and RNA synthesis; selenate reductase, a molybdenum-containing enzyme which catalyses the reduction of selenate and CTr1 p, a protein responsible for the transport of copper into the cells of yeast. The structures of each of these proteins will be solved by X-ray crystallography.

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F10009065

Dr JM Matthews

**Fellowship Type:** ARF

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title:** Nuclear LIM-only transcription factors: characterisation, interactions and semi-rational design of specific inhibitors.

**Summary:**

Most events in human development depend on the coordinated interaction of specific proteins. Serious problems arise when this coordination breaks down. In a childhood leukemia a series of critical protein-protein interactions are blocked when the over-production of a protein called LMO2 is activated. The discovery of the molecular mechanisms by which LMO2 causes leukemia will form the basis for the semi-rational design of specific inhibitors for LMO2. This paves the way for the development of new specific treatments for leukemias - diseases for which currently available chemotherapies are notoriously toxic.

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F10009111

Dr D Modjeska

**Fellowship Type:** SRF

**Category:** 4203 - CULTURAL STUDIES

**Title:** Post-Colonialism and Life Writing: Papua New Guinea since 1966

**Summary:**

To investigate the intersections of race, gender and the arts in post-colonial PNG by following the life narratives of students, both black and white, who attended UPNG between 1966 and independence in 1975. This generation of students challenged well-established colonial values, discourses and patterns of interaction, yet there has been no research into its role in the unfolding of PNG post-colonialism. The project will also develop life writing as a form of intellectual practice that can interweave the intimate and literary accounts of individual lives with the shared narratives of a contested past and unstable present.

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F10009064

Dr SA Mycak

**Fellowship Type:** ARF

**Category:** 4202 - LITERATURE STUDIES

**Title:** The institutionalisation of Australian literature and literary culture since the second world war.

**Summary:**

The aim of the project is to study the specific ways in which Australian literature and literary culture has been institutionalised since the second world war. The two expected outcomes are a new model theorising Australian literature and literary culture, and a systematic empirical account of aspects of Australia's national literature and literary culture. The findings will add new knowledge - both theoretical and empirical - to the current field of Australian literary studies. The findings will also situate Australia within a recognised international scholarly field.

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F10009035

Dr JK Rosenblatt

**Fellowship Type:** APD

**Category:** 2903 - MANUFACTURING ENGINEERING

**Title: The Fusion of Qualitative and Quantitative Methods in Achieving Robust Navigation of Autonomous Vehicles.**

**Summary:**

The aim of this proposed research project is to fuse qualitative and quantitative approaches to autonomous vehicle navigation. The project will explore a number of promising approaches to this fusion in order to provide for a robust system. This work will be applied in ongoing projects within the field robotics research group at Sydney University. The primary outcome of this research project will be to provide the necessary principles and methods to enable the future development of robust autonomous vehicle navigation systems in key Australian industrial applications such as stevedoring, mining, and subsea intervention.

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F10009071

Dr H Teo

**Fellowship Type:** APD

**Category:** 4203 - CULTURAL STUDIES

**Title: A comparative history of twentieth-century women's romance writing in the UK, USA and Australia.**

**Summary:**

During the twentieth century the output and consumption of romance novels has increased until romances currently comprise over 50% of the international fiction market. Women's romances provide a way of analysing how a century of feminism and changes in women's socio-economic and political positions have affected women's ideals of gender, romance, sexuality, and the family. While a number of studies have compared British and American romances, Australian romances have not received much attention. This study examines what is common to Western romances, while analysing the differences that arise from their specific cultural histories.

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F10009103

Dr DR Williams

**Fellowship Type:** SRF

**Category:** 2505 - MACROMOLECULAR CHEMISTRY

**Title:** Deformation and Dynamics of Single Polymer Chains

**Summary:**

The project focuses upon single polymer chains. Over the past decade several new experimental techniques have been developed which permit the direct imaging and manipulation of individual chains. These advances have opened up a vast array of new problems for theoreticians with potential applications in different disciplines, including chemistry, physics, engineering, biology and materials. This project focuses upon the deformation and dynamics of single polymer chains. These include "semi-flexible" chains, such as DNA and "ribbon" polymers which have significant bending rigidity, and flexible chains which are "pulled" or squashed by finite-sized obstacles.

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# Deakin University

F10014052

Dr PR Gilson

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title:** The molecular basis of mitochondrial division.

**Summary:**

I am seeking to understand how mitochondria, the essential energy producing compartments of cells, divide and are handed down through cellular generations. Since we know that mitochondria are derived from bacteria that were engulfed and retained by cells over a billion years ago, I will exploit recent advances in studies of bacterial division molecules to look for similar molecules in mitochondria. I already have results indicating that the bacterial division protein, FtsZ, is present in mitochondria, and will use this exciting advance as a basis for work that will lead to a model for the division of all mitochondria.

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# La Trobe University

F00001045

Dr TJ Curnow

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 3802 - LINGUISTICS

**Title:** A cross-linguistic typology of first/non-first person marking systems and related splits in evidentiality systems.

**Summary:**

This project investigates systems of person marking across languages of the world, examining those with distinction only between first ('I') and non-first ('you, he, she') person. It also investigates evidential systems which distinguish between first and non-first person, describing the similarities between these evidentiality systems and person marking systems. While these two systems are traditionally treated as unrelated, there are clear areas of overlap. This will be the first cross-linguistic study of these phenomena in a wide range of unrelated languages, and will thus make a significant contribution to the understanding of the underlying cognitive and linguistic mechanisms involved.

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F00000440

Dr MT Ryan

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title:** The mammalian protein import apparatus of the mitochondrial outer membrane.

**Summary:**

Nearly all proteins of the mitochondria are imported into this compartment after their synthesis in the cytosol. While mitochondrial protein import has been studied in detail in fungal cells, little is known about this process in mammals and few components of this import apparatus have been identified. The aim of this project is to isolate components of the import machinery of the mitochondrial outer membrane from mammalian cells and to identify and characterize their roles in mitochondrial protein import.

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# Monash University

F10017012

Dr M Bunin Rooney

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2504 - ANALYTICAL CHEMISTRY

**Title:** Electrochemical Characterization of the Neurotransmitter Substance P and its Application to Measurements in Brain Tissue.

**Summary:**

The goal of this project is to develop a biosensor utilizing electrochemistry at microelectrodes for the measurement of substance P concentration changes in brain tissue. The high spatial and temporal resolution afforded by this technique will greatly enhance our understanding of the role of substance P in brain function and dysfunction. Substance P has been implicated in pain transmission, learning and memory, and the treatment of depression. Thus, increased knowledge of substance P neurotransmission in mammalian brain could contribute to the development and understanding of therapies for depression and neurodegenerative disorders such as Parkinson's disease, Huntington's disease and Alzheimer's disease.

\*\*\*

F10017027

Dr KA Gross

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Title:** Fluoride Shell - Lessons from Teeth Revolutionize Biomedical Coatings for Implants

**Summary:**

Hydroxyapatite, the inorganic phase of bone, is used commercially as coatings on medical devices intended for fixation to skeletal tissue. It provides unmatched performance compared to previous technologies, however, the thermal instability of hydroxyapatite has produced implant loosening. Work at the forefront of technology has revealed how coating structure influences loss of prosthesis function. The project proposes transferring a concept from dentistry where a more thermally stable and less soluble fluorapatite layer on each particle can act as a thermal barrier in the coating process, control coating dissolution and release fluoride for possible bone growth, useful in osteoporotic patients.

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F10017015

Dr MJ Hardie

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Title:** Supramolecular host-guest chemistry of large guest molecules; combining host-guest chemistry with crystal engineering.

**Summary:**

Expand the supramolecular chemistry of large guest molecules, by coupling established shape specific host-guest chemistry with other facets of supramolecular phenomena such as the self-assembly of hydrogen bonded arrays to produce infinite networks or discrete supramolecular capsules with hosting abilities. This area of research has significance in separations science and nanotechnology, as well as the intrinsic value of studying supramolecular interactions that are of fundamental importance in many biological and, increasingly, chemical processes. It is anticipated that new classes of supramolecular materials will be established, important for expanding the scientific base for nanotechnology in Australia.

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F10017034

Dr J Sun

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2914 - MATERIALS ENGINEERING

**Title:** Preparation and Characterisation of Novel Alkaline Polymer Membranes for Electrochemical Devices

**Summary:**

This project will develop novel alkaline polymer membranes, involving a number of different polymer-base systems. Such polymer membranes find application as solid polymer electrolytes in fuel cells, batteries and other electrochemical devices. After preparation of the polymer membranes, the conduction mechanism in the membranes, and the relationship between the polymer structure, membrane composition, and their material properties will be investigated. This knowledge will be used to optimise the polymer membrane with respect to high conductivity, thermal and mechanical stability.

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F10017024

Dr YM Tan

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Title: STUDYING HETEROGENEOUS ELECTROCHEMICAL PROCESSES USING THE WIRE BEAM ELECTRODE METHOD**

**Summary:**

Electrochemical heterogeneity plays a key role in many electrochemical processes and is a major controversial subject in electrochemistry. Recently, a novel method called the wire beam electrode (WBE) has been developed by the applicant to measure heterogeneous electrochemical processes and kinetics. This project plans to further develop the WBE into a general method of studying heterogeneous electrochemistry. The WBE will be applied to study various industrial electrochemical processes including pitting and crevice corrosion, cathodic protection, electroplating, electrowinning and metal replacement reactions, also to study controversial electrochemical phenomena including electrochemical noise and the influence of electrochemical heterogeneity on conventional electrochemical measurements.

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# Royal Melbourne Institute of Technology

F00000932

Dr PA JONES

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 4301 - HISTORICAL STUDIES

**Title:** Unsettled Arrival: Desertion from Merchant Ships at Australian Ports, 1901-1975

**Summary:**

The aims are to clarify and explain the regional, social and economic dimensions of desertion from merchant ships at Australian ports, determine the implications for Australian and British shipping economy, and the importance of deserters to Australia's migration history. Many tens of thousands of European and British seamen deserted ship, far outnumbering coloured deserters. This study will consider how desertion and its containment variously departed from or promoted national policies. The study will advance our understanding of Australia's migration and maritime histories and contribute to current debates on the definition of the boundaries of the nation and the national community.

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# **Swinburne University of Technology**

F10019001

Dr L Chen

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2903 - MANUFACTURING ENGINEERING

**Title:** A Modelling Study of Abrasive Waterjet Cutting Process with Nozzle Oscillation Techniques.

**Summary:**

A nozzle oscillation technique will be applied to the abrasive waterjet process to minimise striations on the cut surface. The abrasive water jet dynamic characteristics during oscillation cutting process will be investigated using two non-invasive techniques: x-ray densitometer system and Laser Doppler Anemometry. The analytical process modelling studies will be developed for the oscillation cutting prediction and optimisation.

\*\*\*

# The University of Melbourne

F10020019

Dr CS Greenhill

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Title:** Random graphs and the Markov chain Monte Carlo method

**Summary:**

Many computational problems in computer science, statistics, physics and biology can be reduced to the problem of obtaining random samples from some large set. The Markov chain Monte Carlo method is a framework for designing randomized algorithms to solve such problems. The project aims to apply the Markov chain Monte Carlo method to outstanding open problems in another important area of combinatorial research: namely, random graph theory. Techniques from both areas will be used to analyse the resulting algorithms.

\*\*\*

F10020067

Dr C Jin

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Title:** A QCD approach to inclusive radiative decays of B mesons and possible new physics signals

**Summary:**

This project addresses hadronic bound state effects and possible new physics effects on inclusive radiative decays of B mesons. A QCD approach will be developed using the new theoretical ideas and techniques. Improved predictions for the branching ratio, the decay distributions, and the CP asymmetry will be obtained, leading to one of the most stringent tests of the standard model and advancing our understanding of the structure of hadrons and the nature of confinement. New physics effects beyond the standard model will be explored. Measurements of inclusive radiative decays of B mesons may actually provide the first hints on physics beyond the standard model and help unravel one of nature's great secrets - why the universe is composed almost entirely of matter rather than antimatter.

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F10020020

Dr JH Manton

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Title:** Semi-blind channel identification and source separation for wireless communications

**Summary:**

This project aims to devise and study new signal processing techniques for the efficient transmission and reception of signals in wireless communications. This will be achieved by applying (and developing further) recent advances in Bayesian estimation theory and polynomial system theory. The expected outcomes include new techniques and algorithms for more efficient communications as well as a greater understanding of the theoretical limitations of current techniques. Favourable outcomes will significantly increase the performance of mobile, wireless and satellite communication systems in military and civilian applications.

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F10020028

Dr LJ Parry

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2706 - PHYSIOLOGY

**Title:** Regulation of ovarian and uterine function during pregnancy in marsupials

**Summary:**

In mammals, birth is preceded by cervix dilation and the initiation of uterine contractions. Two hormones, relaxin and oxytocin, are thought to cause these modifications in the reproductive tract. This project will use the unique opportunities provided by marsupials to demonstrate that the fetus is instrumental in regulating its own uterine environment, especially at the end of pregnancy. It will investigate mechanisms that affect ovarian and placental relaxin production and establish a role for relaxin in the uterus and cervix. This project will also investigate the fetal influence on uterine oxytocin receptors and establish other endocrine factors that increase oxytocin receptors at term

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F10020050

Dr MA Sandiford

**Fellowship Type:** Senior Research Fellowship

**Category:** 2601 - GEOLOGY

**Title:** Heat production, tectonic feedback and the shaping of the Australian continent

**Summary:**

The continents are shaped through complex interactions between the primary tectonic processes of magmatism, metamorphism, deformation, erosion and sedimentation. Because these processes modify the distribution of heat producing elements, and are themselves temperature sensitive, they must be subject to important feedback loops. This project will use constraints on heat producing element distributions in the Australian crust, and the way in which these distributions have evolved during various tectonic processes, to elucidate the nature and significance of "tectonic feedback" and its role in shaping the Australian continent.

\*\*\*

F10020002

Dr JB Stockigt

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 4101 - PERFORMING ARTS

**Title:** The other side of the coin: Catholic liturgical music in Lutheran Saxony during Bach's era

**Summary:**

The project examines Catholic liturgical music written and collected between 1719 and 1750 by composers of the Dresden royal chapel-Heinichen, Zelenka, Ristori, Hasse. The significant repertoire assembled to serve Catholic worship in Dresden during the reigns of the Polish Kings and Saxon Electors - Friedrich August I and II - has, until recently, been bypassed by Musicology, which focussed upon Bach and Lutheran traditions within which he worked. Examination of conditions influencing the liturgy and music of the Dresden royal chapel and analysis of surviving works from its collection will redress this imbalance, providing a broader view of Saxon religious music.

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F10020004

Dr SO Warnaar

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Title:** q-Series in integrable lattice models and conformal field theory

**Summary:**

The aim of the project is to study q-series and characters of infinite dimensional algebras from the perspective of integrable lattice models and conformal field theory. This will lead to a deeper understanding of the fermionic quasi-particle description of conformal algebras and will connect various topics in combinatorics to conformal field theory and solvable lattice models. Expected outcomes are extensions of the celebrated Bailey lemma, new Rogers-Ramanujan type identities and insights in the Borwein conjectures of partition theory. It will also further elucidate the surprising connections between integrable systems and the theory of symmetric functions.

\*\*\*

# Griffith University

F00000276

A/Prof IR Hunter

**Fellowship Type:** Senior Research Fellowship

**Category:** 4401 - PHILOSOPHY

**Title:** *Authoritarian Liberalism: Two Studies in Its Genesis and Development.*

**Summary:**

This project aims to recover the neglected historical phenomenon of authoritarian liberalism, which can be understood as the creation of liberal rights by non-democratic governments for reasons of state, and which emerged earliest and with most force in early modern Germany. The project thus aims to challenge our understanding of the governance of tolerant pluralistic civil societies by showing their radical historical dependence on authoritarian liberalism. It will issue in two monographic studies: one outlining the emergence of authoritarian liberalism as a political doctrine and practice, and the other providing an in-depth account of early modern Germany's most influential authoritarian liberal: Christian Thomasius.

\*\*\*

# James Cook University

F00000550

Mr KR Anthony

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2706 - PHYSIOLOGY

**Title:** Sediment feeding vs sediment stress in corals: an experimental analysis of physiological niches on inshore reefs

**Summary:**

The water quality of nearshore environments in the Great Barrier Reef lagoon are characterised by high turbidity and sedimentation, conditions that are considered unsuitable for corals. Nevertheless, many healthy reefs prosper under extreme levels of sedimentation and turbidity. This study proposes an investigation into the ecophysiology of nearshore corals to discern which modifications or strategies enable inshore corals to sustain growth in extremely turbid conditions. Specifically, the project will address the hypothesis that inshore corals utilise sediment as a food source to the extent that it offsets stress effects and the reduced photosynthesis by their symbiotic algae under turbid conditions.

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F00000413

Mr PL Munday

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title:** Bi-directional sex change in coral-dwelling fishes

**Summary:**

The ability to change sex more than once in a lifetime has recently been detected among coral-dwelling fishes. Determining the mechanisms driving sex change in these species will have important implications for understanding the functional role and evolutionary advantage of sex change. This project will test hypotheses regarding the advantage of bi-direction sex change and determine the energetic and ecological cost of changing sex in each direction. It will also investigate the sequence of development during sex change in each direction. This research will lead to a more comprehensive understanding of the processes and advantages of sex change.

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F00000574

Dr MJ van Oppen

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title:** Genetic diversity and specificity of acroporid coral-dinoflagellate symbioses

**Summary:**

One of the dominant features of coral reefs is animal-algal endosymbiosis. This project aims to investigate genetic diversity of algal symbionts, the extent of symbiosis polymorphism (the occurrence of more than one symbiont strain in a single host species and/or vice versa) and the specificity of algal-coral associations in acroporid corals. Knowledge of the adaptive significance of particular coral-zooxanthella associations as well as the levels of genetic biodiversity present in coral assemblages is relevant to conservation of corals and coral reefs.

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F00000571

Dr AL Watchman

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2603 - GEOCHEMISTRY

**Title:** The nature of organic matter in rock surface accretions

**Summary:**

Thin mineral deposits cover many indigenous rock paintings and engravings and natural rock surfaces. Radiocarbon dating these deposits is currently problematic because they contain carbon-bearing substances of different origins and ages. Chemical isotope techniques can separate and identify each carbon compound to 'finger-print' the source: plant, fungal, algal or bacterial. Tropical and grassland vegetation types are discriminated by their characteristic photosynthetic compounds. The project therefore aims to detect environmental changes and more accurately date natural rock surfaces and rock art by determining the chemical nature and ages of individual organic components in rock surface accretions.

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F00000539

Dr M Waycott

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title:** Genetic diversity and gene flow in tropical seagrasses

**Summary:**

Tropical seagrasses are poorly studied despite their important role in nearshore and coral reef communities. The assesment of genetic diversity in two tropical seagrass species, widespread throughout the Indo-Pacific, will provide important base-line information on population genetic structure, gene flow and evolutionary trends. In addition, microsatellite markers developed for this project will be useful in a wide array of applications including assessment of changes in populations through time, population recovery and the impact of grazing by dugong on seagrass population genetic structure and gene flow.

\*\*\*

# The University of Queensland

F10027060

Prof DJ Craik

**Fellowship Type:** Senior Research Fellowship

**Category:** 2503 - ORGANIC CHEMISTRY

**Title: NMR in Drug Design: cyclisation and cyclic permutation as tools in the development of novel molecular templates.**

**Summary:**

Proteins are linear chains of amino acids which fold into complex shapes to facilitate their various functions. Our discovery of the first and so far only known family of naturally occurring cyclic proteins has suggested intriguing possibilities for the design of new proteins. Joining the normally untied ends of proteins to form cyclic backbones potentially leads to improved stability and biological activity, new topologies and new protein frameworks. This research program will explore the chemistry of these fascinating cyclic proteins, discover how they are produced by plants and will exploit the knowledge in a range of pharmaceutical and agrochemical applications.

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F10027034

Dr AS Grutter

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title: The cleaner fish-client fish symbiosis: testing the ecological importance of cooperation in a multispecies mutualism**

**Summary:**

This study will test game theory models of cooperation to determine how mutualisms involving many species function. Using the cleaner fish-client fish symbiosis as a model system, the proposed study will determine how costs and benefits influence behavioural interactions and what factors maintain or affect cleaning interactions. This will be done in a novel approach using parasites as tools in field and laboratory experiments. The outcomes expected are information on the role of cleaning behaviour on coral reefs and fundamental knowledge on the ecology and evolution of cooperation in general.

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F10027024

Mr MJ Hornsey

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 3801 - PSYCHOLOGY

**Title:** Subgroup dynamics during social conflict: Implications for collective action.

**Summary:**

The proposed research aims to develop and test a model based on SIT/SCT examining subgroup dynamics during collective action. This has theoretical significance, as intergroup research traditionally assumes that groups are unstratified structures; never before have subgroup relations been examined in the context of a superordinate conflict. This research will help identify when and why intragroup tensions occur during collective action, with ramifications for unions, businesses, and sociopolitical groups. Expected outcomes include:- conceptual and theoretical development in the field of intergroup relations- at least four articles published in leading international journals- at least three presentations at international conferences.

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F10027051

Mr CJ Noble

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2502 - INORGANIC CHEMISTRY

**Title:** Orientation selective ESEEM/ENDOR: Determination of crystallographic information of the metal ion's coordination sphere in metalloenzymes

**Summary:**

Orientation selective ESEEM/ENDOR has the capability of determining detailed crystallographic information (distance and relative orientation) of nuclei in the coordination sphere of metal ion sites in metalloenzymes with a precision greater other techniques. This project has three major objectives: . To extend experimental methodologies for orientation selective ESEEM/ENDOR . To develop computer simulation software for the analysis of experimental spectra which will be commercially released through Bruker Analytik.. To use these techniques to characterise the metal ion active sites in dimethyl sulfoxide reductase, purple acid phosphatases and human cytochrome P450 3A4.

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F10027029

Dr TC Ralph

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2404 - OPTICAL PHYSICS

**Title:** Quantum Information with Continuous Variables

**Summary:**

The unique properties of quantum mechanics make qualitatively different types of communication and computation possible. Classical information can be encoded digitally using two distinct physical states, labelled by zeros and ones. These are called bits. Quantum systems can be placed in simultaneous superpositions of distinct states, called qubits. Quantum information is the study of their transmission and processing. More general, continuous manipulations of quantum information have only recently been proposed. These open up a wide range of exciting new scientific possibilities. The pursuit of these possibilities, and consequent fundamental insights and novel technologies, is the subject of this proposal.

\*\*\*

F10027008

Dr H Zhu

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Title:** Fundamental Study on Porous Clay Heterostructures

**Summary:**

This project will develop new porous clay heterostructures from clay minerals, which can be used as new adsorbents, catalyst and catalyst supports. Pillaring and templated synthesis techniques will be combined to achieve effective control over the structure of the nanometre framework pores and surface properties of the products. Superior catalysts for oxidising volatile organic compounds will be developed based on these solids by a new molecular designed dispersion technique. Studies will concentrate on the formation mechanism of these highly porous frameworks, the principles for designing these catalysts, and characterisation of the solids and catalysts.

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# **Curtin University of Technology**

F00001199

Dr AS Collins

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2601 - GEOLOGY

**Title:** **The Birth of Gondwana - Timing, Style and Global Implications of Neoproterozoic Terrace Assembly in Madagascar.**

**Summary:**

The earth's continents have periodically amalgamated to form supercontinents. This project will document the tectonic events that led to the assembly of Gondwana - arguably the most significant of these amalgamation events. Recent work in Madagascar has identified the suture between continental fragments that collided to form Gondwana. Field and laboratory studies of rocks in this suture will yield the first time-integrated framework for Gondwana assembly, which will constrain the tectonic evolution of basement rocks and enable precise time correlations between palaeogeographic changes in continent-ocean distribution and dramatic changes in global environmental conditions that have been tentatively linked to Gondwana assembly.

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# The University of Western Australia

F00000371

Mr SJ Drew

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

**Title:** Coupled vibration and torsional damping of geared rotors

**Summary:**

Equipment failure due to torsional vibration of rotating machinery is a significant problem, particularly for large machines. Low damping levels result in high stresses at resonance, but very little measured data is available. Gearboxes are essential components in many drives. This project aims to investigate the coupled torsional and transverse damping of gears. This includes experimental testing and non-linear modelling of coupled vibration characteristics using the time domain receptance technique. This will lead to significantly improved understanding of torsional/transverse gearbox coupling and its influence on torsional damping. Leading to improved gearbox design and capacity to rectify torional problems.

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F00001309

Dr RE Fredericksen

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 3801 - PSYCHOLOGY

**Title:** The dependence of object-free and object-based visual motion processing on visual field location

**Summary:**

Human observers track the motion of objects in order to interact with them (perceiving object-based motion) and detect global motion within the visual field in order to control self motion and balance (perceiving object-free motion). The visual system has motion mechanisms for both processes but it is not clear when or where in the visual field the mechanisms operate in parallel, in concert or in conflict. The project will answer these questions and will extend our understanding of how humans use visual motion for navigation during day-to-day activities such as walking, or driving an automobile.

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F00000468

Dr C Li

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2301 - MATHEMATICS

**Title:** Finite s-arc-transitive graphs and regular maps

**Summary:**

This project proposes to investigate group actions on certain combinatorial objects - s-arc transitive graphs and regular maps, that is, to investigate groups through their actions on these objects, and to characterise the structure of these objects by analysing the structure and the actions of groups. This investigation will make significant contributions to group theory, graph theory, hyperbolic geometry, computer science and some other areas. The project will produce a satisfactory characterisation of finite basic s-arc transitive graphs and regular maps, new constructions of finite s-arc transitive graphs, and a useable reduction for a long-standing conjecture of Weiss about locally-primitive graphs.

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F00001293

Dr AN Luiten

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2404 - OPTICAL PHYSICS

**Title:** Development and application of a new generation of Atomic Frequency Standards

**Summary:**

Frequency standards play a vital role in technology and fundamental research. The applicant is involved in separate international collaborations with the two premier metrology institutes of Europe (LPTF and PTB):. Creation of the world's most accurate frequency standard using a cryogenic sapphire microwave oscillator linked to a Cesium fountain standard (LPTF). Creation of the world's first optical time standard using an optical frequency standard and a coherent bridge between the microwave and optical domains (PTB)A successful outcome on both of these counts will have important effects in enabling laboratory scale tests of General Relativity and Quantum Mechanics.

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F00000380

Dr AH Millar

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title: Mitochondrial metabolism in rice following anoxia and the implications for resistance to oxidative stress in crops following submergence**

**Summary:**

Flooding of crop plants causes severe economic losses due to reduced plant growth and plant death. These losses are due to both the lack of oxygen for cellular respiration that is available under water and the sudden increase in available oxygen after flooding, which causes oxidative stress for a tissue that is unprepared for aerobic metabolism. Characterising the changes in respiration at the level of whole plant metabolism, enzyme activities, and specific protein and mRNA abundances in rice genotypes with varying flood tolerance will identify biochemical traits that are involved in the phenotypic advantages displayed by these plants.

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F00001288

Ms Z Peng

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

**Title: The development of a particle analysis system for machine condition monitoring using laser scanning confocal microscopy**

**Summary:**

The aim of the proposed project is to extend the capabilities of laser scanning confocal microscopy (LSCM) and to develop an automated wear particle analysis system for machine condition monitoring. The expected techniques will overcome the limitations of current wear particle analysis methods, and allow machine condition monitoring and fault diagnosis to be performed more accurately and effectively. At completion of the project, an automated LSCM particle analysis system will have been produced for machine condition monitoring and the system will be commercially available for this application if possible.

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F00000398

Dr B Rasmussen

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2601 - GEOLOGY

**Title: Early-diagenetic phosphates: their impact on marine phosphorus and rare-earth cycles, and potential for high-precision dating of biological and environmental events**

**Summary:**

This project will use phosphate minerals recently identified as early-diagenetic precipitates (i.e. forming shortly after deposition) to constrain the timing of major events in Earth's early history. Specifically, the project will date the dramatic rise in atmospheric oxygen, glaciations during the Neoproterozoic and the evolution of multicellular animals (metazoans), using radiometric age-dating methods recently developed at UWA. This study will also establish the impact of early-diagenetic phosphates on the geochemical cycles of phosphorus and rare-earths through time. The results will have important implications for the marine budgets of these elements, and their use in palaeoceanographic, environmental and crustal evolution studies.

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F00001266

Dr P Sharpe

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 4301 - HISTORICAL STUDIES

**Title: Women's Business: Female Enterprise and Economic Initiatives in Early Industrial Society**

**Summary:**

\* A monograph entitled: Women's Business: A Study of Female Businesswomen in Early Industrial Society 1600-1850\* A co-authored book with Professor Pat Hudson on Women and Industrialisation: Britain 1700-1850The project will present, analyse and interpret the evidence for women's engagement in many forms of trade during the period 1600-1850, develop a picture of women's active role in early industrial economies and provide a new perspective on the gendered aspects of commercial activity itself. The expected outcomes are a monograph, a book to be published by Arnold, several journal articles, a conference and a chapter in an edited anthology.

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F00000393

Dr LW Simmons

**Fellowship Type:** Senior Research Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title:** Sperm Competition and Sexual Selection

**Summary:**

When females mate with two or more males their sperm will compete for fertilizations. Sperm competition should favour the evolution of adaptations in males that maximise reproductive success. This research will test recent theoretical models of sperm competition concerning the evolution of ejaculate size and sperm morphology. It will examine female influences over fertilisation events and the adaptive significance of female promiscuity. Finally, I will develop this research to incorporate an examination of selection acting on male parental behaviour, and the maintenance of alternative reproductive strategies. The research will foster international collaboration and lead to new developments in evolutionary theory.

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F00000329

Dr JL Tomkins

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title:** The Evolution of Male Dimorphisms

**Summary:**

In some species, males have evolved more than one way of acquiring females. Commonly small males avoid aggression and larger males fight. In such species, large and small males often differ in their morphology. For example, in dung beetles large males possess horns whilst small males are hornless; a male dimorphism. What determines the proportion of males of each type, in a species or a population, is unknown. I aim to test recent theoretical models which suggest that ecology and demography have a strong influence on the evolution of male dimorphisms, research which will significantly advance our understanding of evolution.

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F00000488

Dr PV Wheatley

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 4301 - HISTORICAL STUDIES

**Title:** Demetrius the Besieger

**Summary:**

To complete the project begun by my PhD thesis: the definitive biography of Demetrius Poliorcetes "The Besieger of Cities" (336-282 B.C.), one of the most outstanding, yet enigmatic figures who presided over the disintegration of Alexander the Great's empire after 323. The period is pivotal in the history of Greek culture, marking its fusion with the Asiatic empires and the point from which Hellenistic influence became fundamental in the development of modern western culture. Expected outcomes include a significant monograph and numerous articles, as well as a theoretical treatise on the original methods of historical research developed in the course of my doctoral candidature, which may then be applied to other historical fields.

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F00000330

Dr D Yu

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Title:** Spin-resolved electron correlation in the excitation of xenon atoms by polarized electrons

**Summary:**

The combination of polarized electrons and the electron-photon polarization coincidence technique will be applied to study selected excited atomic and ionic states of xenon. New detailed information for the spin-orbit, exchange interactions and angular momentum coupling effects in the direct excitation and simultaneous ionization with excitation processes will be obtained. The investigation will provide valuable information for understanding the fundamental interactions in nature.

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# The Flinders University of South Australia

F00000106

Dr D Fursa

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Title:** Calculation of Electron Scattering on Complex Atoms and Ions

**Summary:**

This project will deal with calculations of electron-atom/ion scattering processes that are important for technological applications as well as for understanding the fundamental physics of few-body reactions in general. The Convergent Close Coupling (CCC) method will be used for this study. This method has established itself as one of the most successful reaction theories to date. The aim of the project is to extend the CCC method to complex atoms and ions and to take into account relativistic effects in scattering and target structure.

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# The University of Adelaide

F10033733

Dr PG Bouwknecht

**Fellowship Type:** Senior Research Fellowship

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Title:** Mathematical and physical aspects of quasi-particle excitations in quantum many body systems

**Summary:**

Quantum many body systems in low dimensions exhibit curious phenomena such as the existence of collective excitations carrying quantum numbers which are fractions of the quantum numbers carried by the microscopic degrees of freedom in the system. An essential aspect of these so-called quasi-particles, is that their statistics will be equally unusual. This project aims to study both the mathematical structure behind these quasi-particles as well as physical applications. Expected outcomes are a better understanding of the possible forms of (exclusion) statistics, of two dimensional conformal field theories and of the representation theory of quantum groups.

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F10033731

Dr A Kalloniatis

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Title:** Explanations of Quark Confinement and Constant Background Self-Dual Gluon Fields

**Summary:**

Despite various partial and even conflicting explanations, a microscopic and intuitive understanding of the unique phenomenon of quark confinement within the theory of quantum chromodynamics has been outstanding since 1973. This project builds upon the author's contributions to the hypothesis that confinement is a consequence of constant self-dual gluons dominating the vacuum state in hadron physics. Deepening the quantum field theoretic understanding of this specific mechanism is the first goal of the project. However, the deeper goal is to use this formulation to unify the various accounts of confinement.

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# University of Tasmania

F00001150

Mr CJ Bradshaw

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Title:** The effect of spatial and temporal variation in marine productivity on energy acquisition in female southern elephant seals, *Mirounga leonina*

**Summary:**

The demography of high level Antarctic predators is ultimately determined by the oceanic processes that influence the spatial and temporal distribution of primary productivity. This study will quantify the links between the foraging performance of southern elephant seals and a range of oceanographic parameters, including sea surface temperature, productivity and bathymetry. These data are a crucial component to our understanding of how Antarctic predators will respond to changes in the distribution of marine resources as a result of global climate change or commercial fishing

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F00000860

Dr LH Kerckhoffs

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2704 - BOTANY

**Title:** Phytochromes and Flowering in Pea

**Summary:**

The inhibitory component in the flowering response of pea (*Pisum sativum* L.) is strongly regulated by the phytochrome system via two distinct responses. In a mutant-based approach, we will assign these phytochrome responses to specific phytochrome types and study the (inter-) action of the phytochrome genes (PHYA, PHYB) and the flowering genes (SN, DNE, PPD, E, HR, GI, LF, VEG1). The nature of the inhibitory pathway will be characterised on a molecular level by cloning pea homologues of clones Arabidopsis genes. The linkage and co-segregation with physiologically characterised pea mutations will then be determined. This will allow the physiological and genetic model for the regulation of flowering in pea to be integrated with the molecular model developed in Arabidopsis.

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# The Australian National University

F00000051

Dr S Angelides

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 4203 - CULTURAL STUDIES

**Title:** A Genealogy of Paedophilia: Age, Sexuality and Subjectivity

**Summary:**

This study involves a cultural and historical analysis of the emergence of the discourse of paedophilia and the category of 'the paedophile'. It will deploy the axis of 'age', or, the distinction between children and adults, as the central analytic device with which to map the historical construction of modern sexual subjectivity in the West. The principal produce of this research will be a major book. It will be the first of its kind, anywhere in the world, to provide an historical account of paedophilia and the dialectical construction of child/adult sexuality from the nineteenth century to the present.

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F00000613

Dr GW Clarsen

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 3706 - HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE

**Title:** Some wheels of one's own: Women construct nation, modernity and self

**Summary:**

A multidisciplinary study of automobile technology in an international context, placing women at the centre. It examines the standard narratives of motoring as a technology of gender, and considers how the artefacts and practices of motoring have historically specific ideas of masculinity and femininity built into them. It explores the variety of ways women have resisted masculinist definitions of the technology and sought to claim it without needing to deny their female specificity. It repositions women as active agents, rather than passive beneficiaries, who help shape the emerging forms of the technology. The primary outcome will be a book manuscript for international publication.

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F00000145

Dr JD Close

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Title:** Are Dilute Alkali Gas Bose Einstein Condensates Superfluid?

**Summary:**

Fundamental to, and unresolved in the field of atom optics are questions addressing the superfluid properties of Bose Einstein condensates. Superfluidity is intimately related to the existence and properties of quantised vortices. The questions we pose and will answer are: Do quantized vortices exist in dilute alkali quantum fluids and how do they move? Are they unstable or metastable? Is there a critical velocity? Can they be produced thermally? What exactly is the connection between vortex formation and superfluidity in these systems? These are cutting edge questions in one of the most important fields in physics.

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F00000053

Prof S Dowrick

**Fellowship Type:** Senior Research Fellowship

**Category:** 3402 - APPLIED ECONOMICS

**Title:** Economic Growth: Its processes, causes and consequences for national welfare

**Summary:**

The project involves joint authorship of an Oxford University Press book on economic growth, analysing diverse approaches to economic growth, including neo-classical growth theory, the 'new' theory of endogenous growth and evolutionary approaches. It will relate theories to the evidence on long-run growth patterns and to econometric studies on post-war growth and development. Related research encompasses a current project investigating international comparisons real living standards and a new project investigating the causes of convergence and divergence in post-war economic growth. Finally, the project will examine the relationship between economic performance and living standards or well-being.

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F00000617

Mr NM Dungey

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2301 - MATHEMATICS

**Title:** Asymptotics of heat kernels

**Summary:**

The aim is to study the large time properties of the heat kernels associated with elliptic, or subelliptic, differential operators. Initially the focus will be on operators on Lie groups of polynomial or exponential growth, with the intention of relating the properties of the heat kernel to the geometric and algebraic properties of the group. It is also proposed to study the kernels of operators on domains in Euclidean space with fractal boundaries, and of operators on vector bundles. In the last-mentioned case there are expected to be applications to the Laplacian acting on differential forms.

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F00000100

Mr M Hoyles

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2499 - OTHER PHYSICAL SCIENCES

**Title:** Development of a useful theory of ion channel conductance

**Summary:**

Ion channels are an essential part of the molecular machinery of life. All reactive tissues rely on ion channels, including the brain and heart. The aim of this project is to develop a useful theory capable of predicting conductance from channel structure. Conductance is the main job of a channel, and is experimentally measurable. The structure of one type of channel has recently been discovered, more are expected to follow. A theory linking these two would constitute knowledge of how ion channels work. If successful this project would put such knowledge at the disposal of all ion channel researchers.

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F00000609

A/Prof VJ Johnson

**Fellowship Type:** Senior Research Fellowship

**Category:** 4203 - CULTURAL STUDIES

**Title:** The history and repercussions of Western Desert art

**Summary:**

No indigenous art movement has emerged more spectacularly than Western Desert art onto the global stage of contemporary art. This project spans the thirty year history of the founding group of Western Desert artists from the Papunya Tula Artists company and their followers, spanning the length and breadth of the desert region. Separate but interrelated studies will focus on the artists comprising the Papunya Tula Artists company, the wider history of Western Desert art, and the indigenous rights issues raised by appropriation of Aboriginal art imageries by commercial and nationalistic interests and the artists' defence of their cultural responsibilities.

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F00000252

Mr PK Lam

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2404 - OPTICAL PHYSICS

**Title:** Metrology and Quantum Communication with Optical Parametric Oscillators

**Summary:**

This fellowship proposal has two objectives: (a) The experimental demonstration of the quantum teleportation of optical information and (b) The generation of multiple correlated photon pairs with an optical frequency comb. Quantum teleportation is a new form of information transport suitable for the transmission and processing of quantum information. Its operation is dependent of correlated and entangled photon pairs. Both experiments are essential fundamental components for the realization of quantum information network and quantum computer.

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F00001359

Dr MB McKenna

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 4301 - HISTORICAL STUDIES

**Title:** A Sceptical Democracy: The Idea of 'the People' in Australian Politics 1788-2001

**Summary:**

The aim of this project is to understand the origin, nature, shifts, and continuities of appeals to popular sovereignty in three crucial periods of Australian history - 1840-1856, 1890-1901, & 1988-2001. The significance of this project lies in its attempt to explain how appeals to popular sovereignty have legitimised Australia's Constitutional democracy. The project will seek to understand the importance of the idea of 'the people' in our past and its resonance in contemporary Australia. The outcomes of the project will include a major monograph published by Cambridge University Press, a smaller textbook published by Penguin, and a three part radio documentary to be broadcast on ABC Radio National.

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F00000149

Dr CR Morton

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Title:** Mechanisms for formation of heavy elements

**Summary:**

The formation of new elements heavier than uranium, is a major endeavour in nuclear physics. Being beyond the borderline of stability, these short-lived nuclei give unique insights into the delicate balance of forces that bind nucleons together. They are formed by fusing two heavy nuclei, a process that is not well understood. The high efficiency of the ANU's fusion spectrometer, and the newly funded superconducting fusion spectrometer will be harnessed to make precision measurements to improve our understanding of fusion of heavy nuclei. This research will maintain Australia's pre-eminence in the study of heavy nuclei, and is likely to have a direct impact on searches for new heavy elements.

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F00000110

Dr PA Pickering

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 4301 - HISTORICAL STUDIES

**Title: Democratic voices: the impact of British democrats on colonial political, social and cultural development c.1840-1901**

**Summary:**

A study of the impact of British democrats and radicals on the political, social and cultural development of the Australian colonies. Through individual and collective case studies that explore the migrant experience in both Britain and Australia, the study will contribute to our understanding of the complex political culture of Australia in the second half of the nineteenth century, as well as to the much neglected history of Chartism in decline. Using both Australian and British sources it will culminate in a comprehensive re-evaluation of the origins of Australian democracy.

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F00000407

Dr PJ Read

**Fellowship Type:** Senior Research Fellowship

**Category:** 4301 - HISTORICAL STUDIES

**Title: The Sacralisation of Ordinary Space**

**Summary:**

The project assigns to the human senses a central place in the study of attachment to Australian place. It investigates the nature and variety of sites regarded by individuals as sacralised and relates them to the wider understandings of Australian identities. This will be the first major study of the way in which Australians choose significant sites at which to meditate, pray, mourn, reflect or rejoice - such as roadside crosses. In focussing on the context and meaning of place to the individual, it expands the frontiers of environmental, cultural and social history. The project completes my three volume study of belonging to and sharing Australian space.

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F00000622

Dr JI Urbas

**Fellowship Type:** Senior Research Fellowship

**Category:** 2301 - MATHEMATICS

**Title:** Nonlinear Partial Differential Equations

**Summary:**

I intend to investigate two closely related classes of nonlinear partial differential equations: Hessian and curvature equations. These have a wide range of applications in differential geometry. Monge-Ampere equations are a particularly important subclass having close connections to mass transfer problems, which have a wide range of applications in mathematics and in other fields. I will develop a comprehensive theory of these equations and their applications, encompassing boundary value problems, extremal solutions, mass transfer problems and curvature flow problems.

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F00000590

Dr DB Ward

**Fellowship Type:** Australian Postdoctoral Research Fellowship

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Title:** Control of Sound Fields Using Loudspeaker Arrays

**Summary:**

Humans have an amazing ability to localise sounds. Placing virtual sound sources around a listener can play an important role in critical applications such as air-traffic control and pilot early warning systems. Immersive 3D audio provides a means of achieving this, although current systems are notoriously non-robust. The fundamental problem underlying 3D audio, and many other acoustic problems, is to control the sound field in an extended region of space. This project will determine the fundamental feasibility of such control using a limited number of loudspeakers, analyze its robustness, and apply the results to develop better 3D audio systems.

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# Ludwig Institute of Cancer Research

F00001455

Dr AC Ward

**Fellowship Type:** Australian Research Fellowship/Queen Elizabeth II Fellowship

**Category:** 3210 - CLINICAL SCIENCES

**Title:** Studies of myeloid leukaemogenesis in the zebrafish

**Summary:**

This project aims to investigate the causes of white blood cell cancer, or leukaemia, at the molecular level, using a novel approach in zebrafish. Zebrafish provide a powerful experimental model for developmental genetics, largely due to the visual and technical accessibility of embryos for experimentation. We plan to introduce a fluorescent molecular tag into the white blood cells in order to directly visualise them. We will then predispose these fish to leukaemia and screen for mutants with enhanced or suppressed leukaemia. We anticipate that the mutants will allow new genes involved in the development of leukaemia to be identified.

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# The Heart Research Institute

F00001444

Dr M Davies

**Fellowship Type:** Senior Research Fellowship

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Title:** Mechanistic studies on the oxidation of amino acids, peptides and proteins and its prevention

**Summary:**

Protein oxidation is a widespread phenomenon of both industrial (food preservation and spoilage) and biological concern (involvement in human disease such as aging, cataract, cancer, atherosclerosis). Despite considerable study, the mechanisms involved in this process are poorly understood, and we lack specific approaches to prevent such damage. This project will use a variety of recently developed methodologies including analytical, synthetic, biochemical and theoretical approaches, to obtain a detailed mechanistic and kinetic understanding of this process, and it will provide a sound rationale for the development of methods which prevent protein oxidation. Such protein-specific antioxidants would have great practical utility.

\*\*\*M\*\*\*